



# FORESTE E CRISI CLIMATICA

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DiSAA  
DIPARTIMENTO  
di SCIENZE  
AGRARIE e  
AMBIENTALI

fiper

FEDERAZIONE ITALIANA PRODUTTORI  
DI ENERGIA DA FONTI RINNOVABILI



Associazione Consorzi  
Forestali della Lombardia

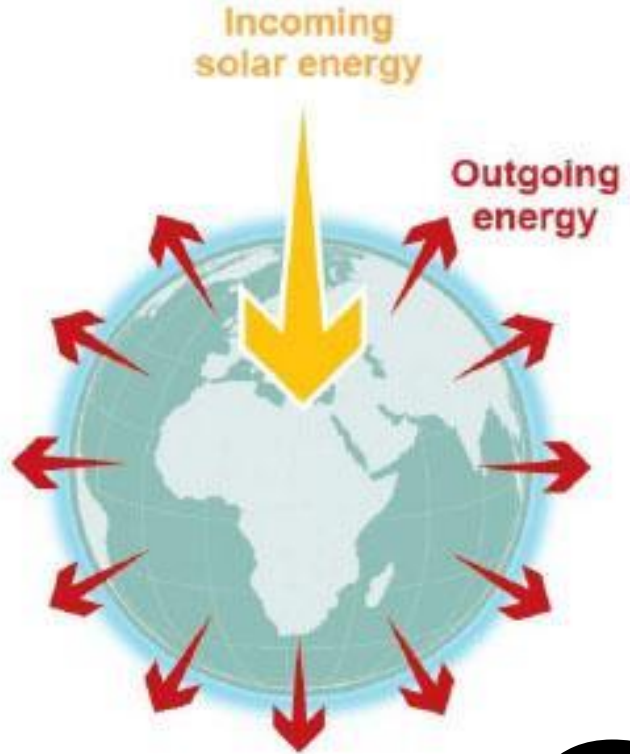
Finanziato da



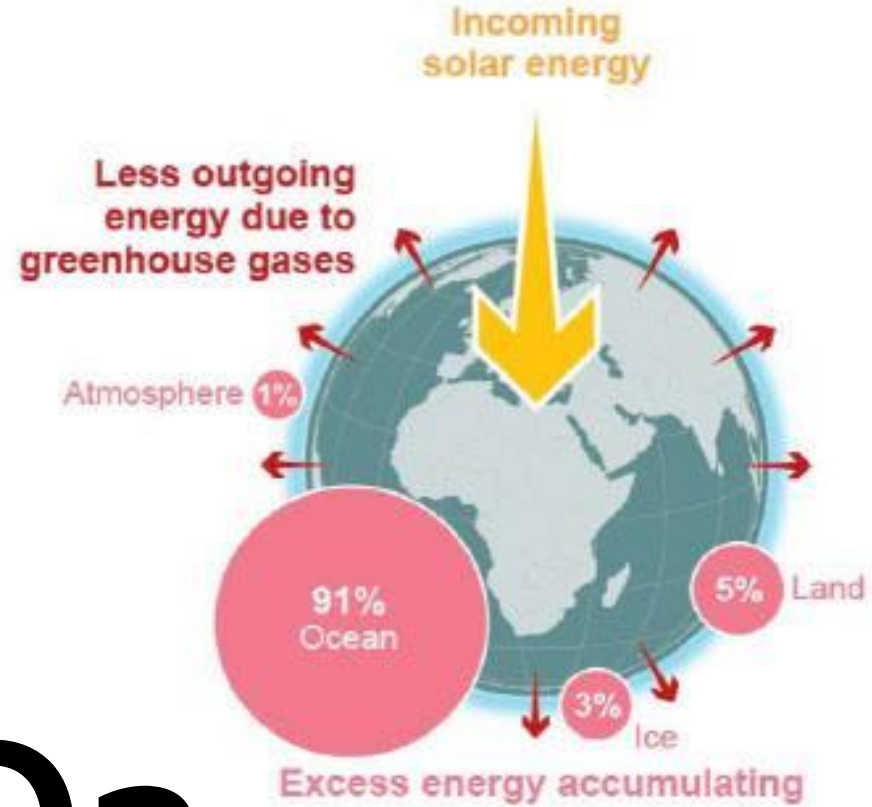
Regione  
Lombardia



## Stable climate: in balance



## Today: imbalanced



# CO<sub>2</sub>

# Temperature change in Europe since 1901

**Siccità**

**Alluvioni**

**Incendi**

**Alterazione degli ecosistemi**

**Danni sociali**

**Danni economici**

1910

1930

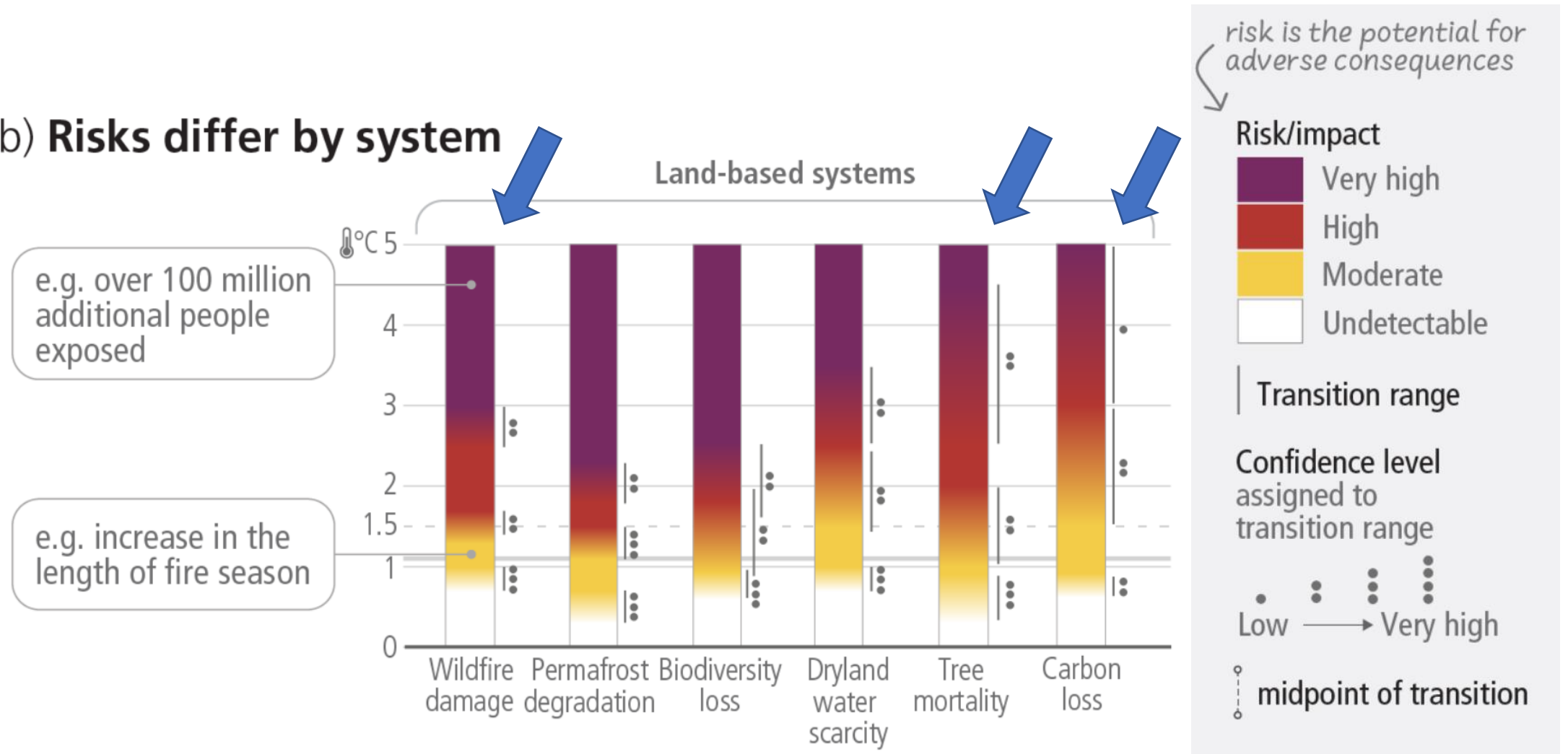
1950

1970

1990

2010

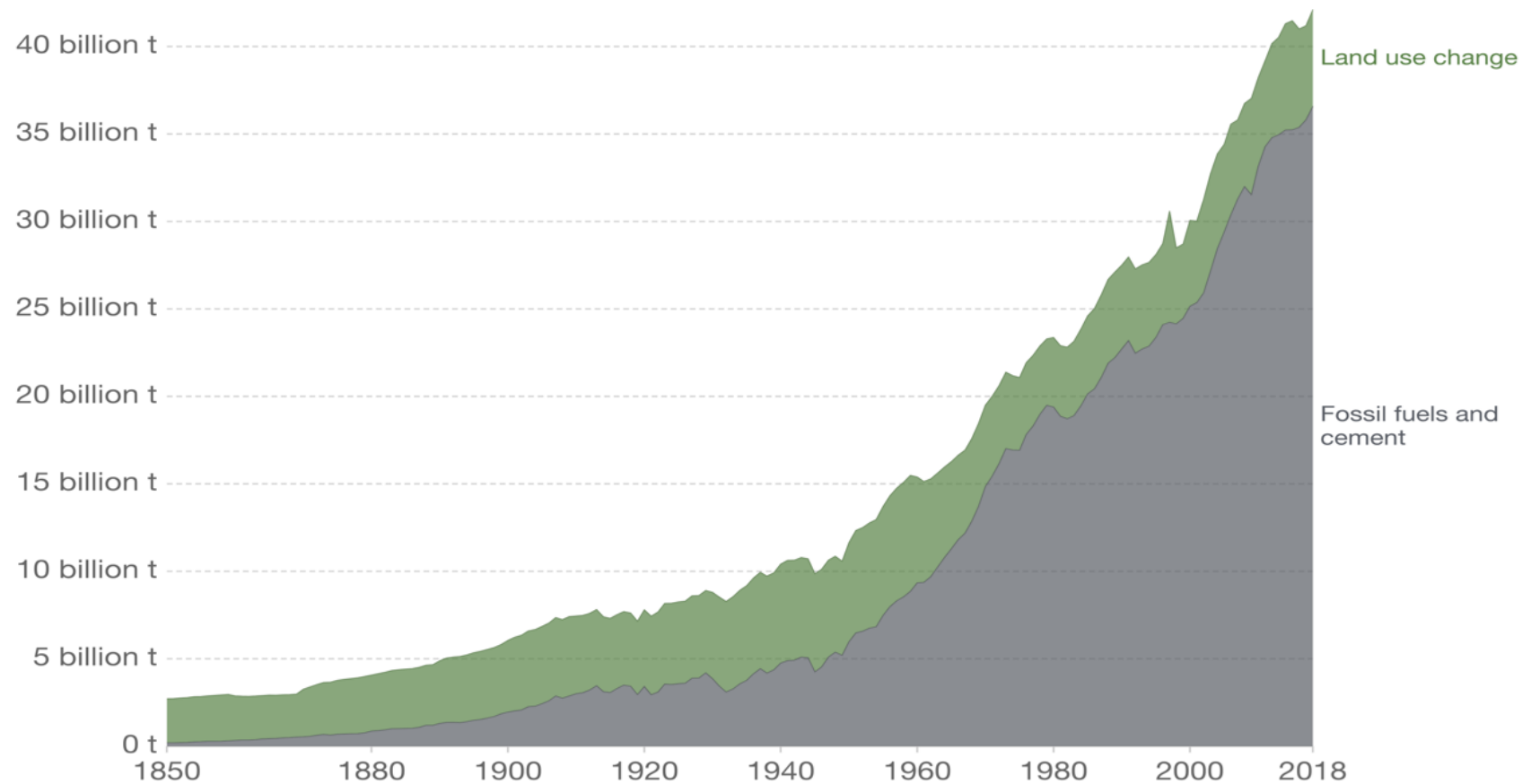
## b) Risks differ by system



# Perché vengono emessi gas climalteranti?

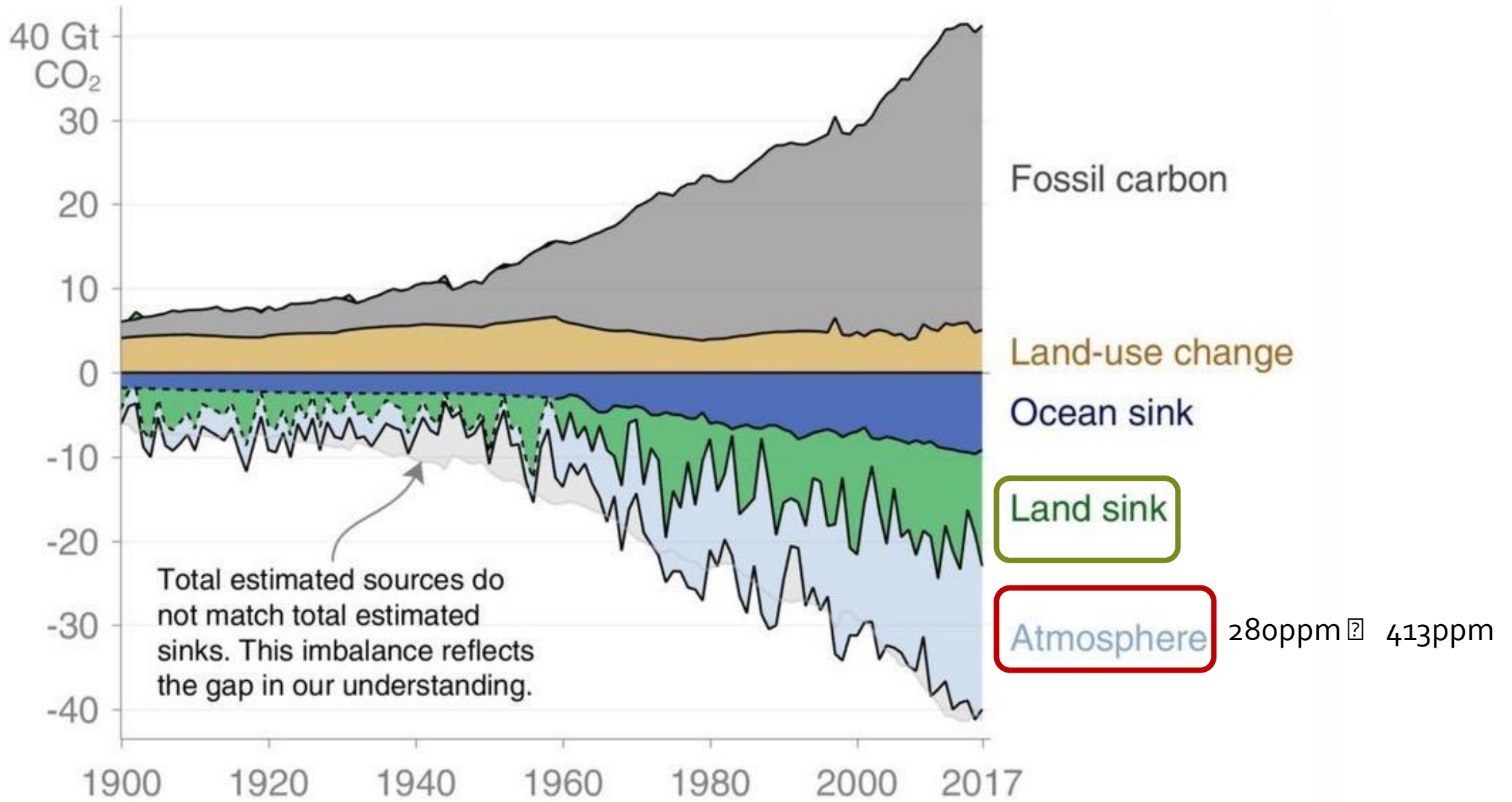
Global CO<sub>2</sub> emissions from fossil fuels and land use change

Our World  
in Data



Source: Global Carbon Project (GCP)

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY



A photograph of a forest with tall, thin evergreen trees and snow on the ground. The trees have reddish-brown bark and green needles. The ground is covered in a layer of snow, and some trees have snow on their branches. The sky is overcast.

Le foreste assorbono il **29%**  
delle emissioni umane di CO<sub>2</sub>

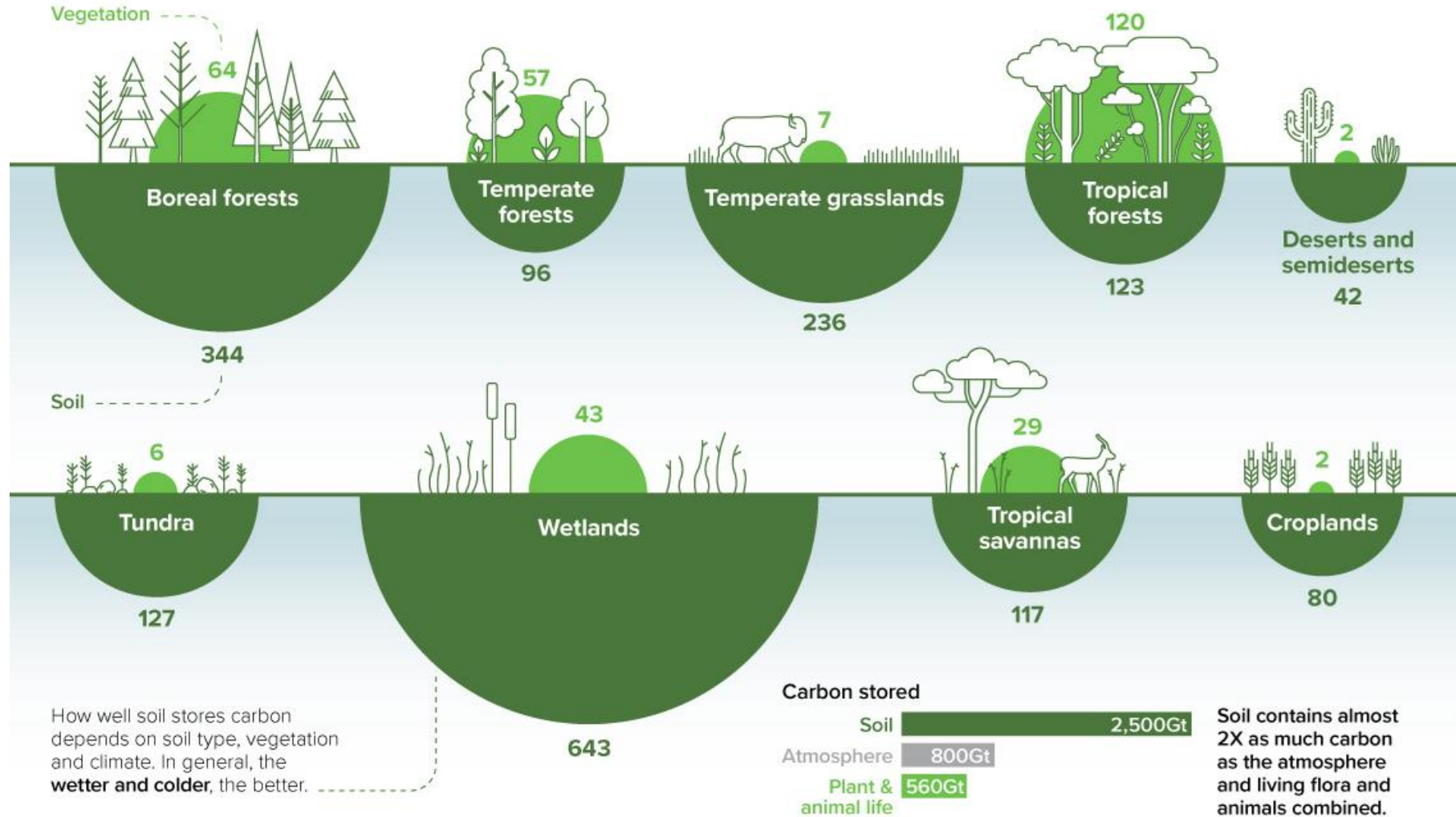


# Carbon Storage

## Tonnes of Carbon per Hectare\*

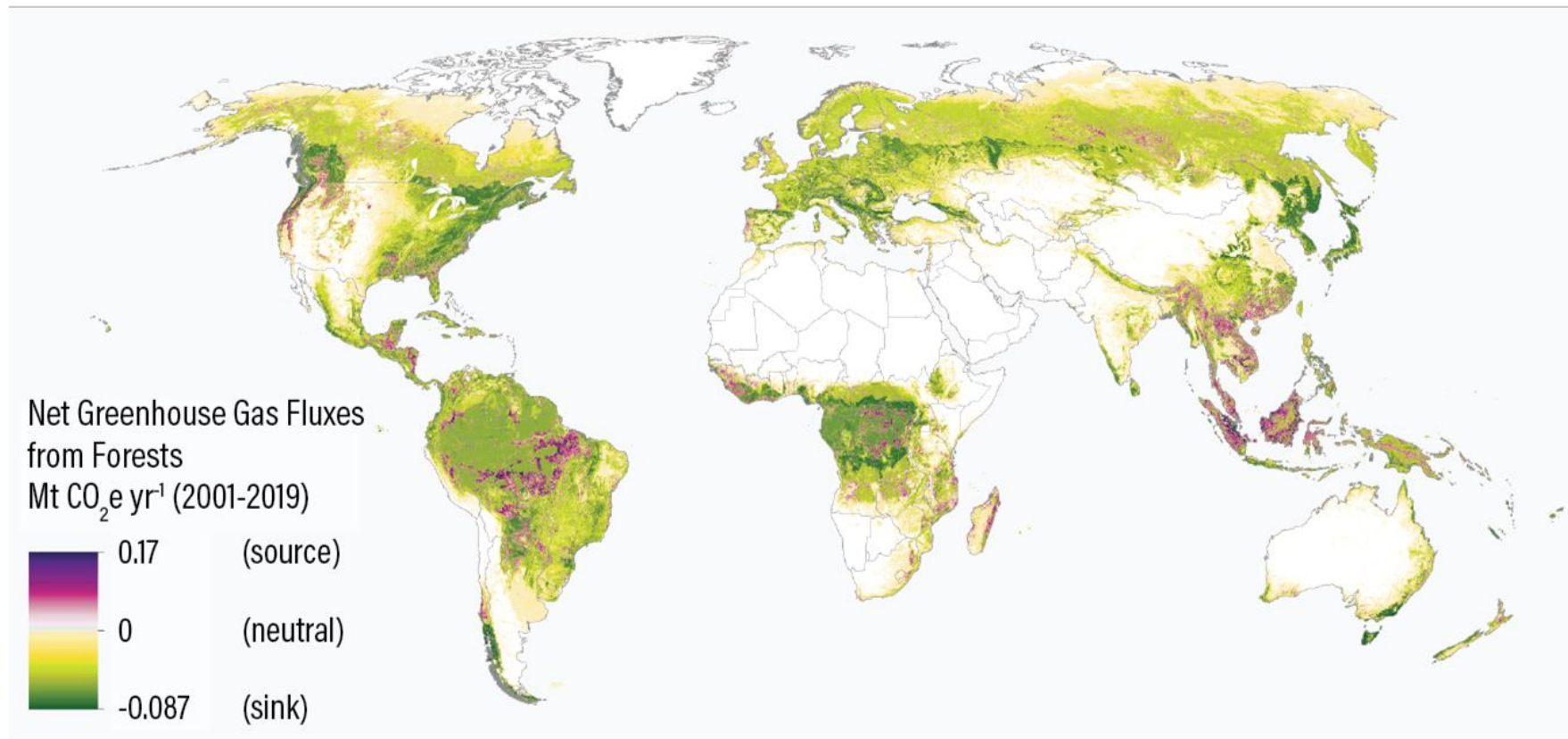
The world's forests absorb around **15.6 gigatonnes** of CO<sub>2</sub> each year. That's around 3X the annual CO<sub>2</sub> emissions of the United States.

However, around **8.1 gigatonnes of CO<sub>2</sub>** leaks back into the atmosphere due to deforestation, fires and other disturbances.



\*At a ground depth of one meter  
Sources: IPCC: NASA

# L'attività antropica può influenzare la capacità delle foreste di assorbire carbonio

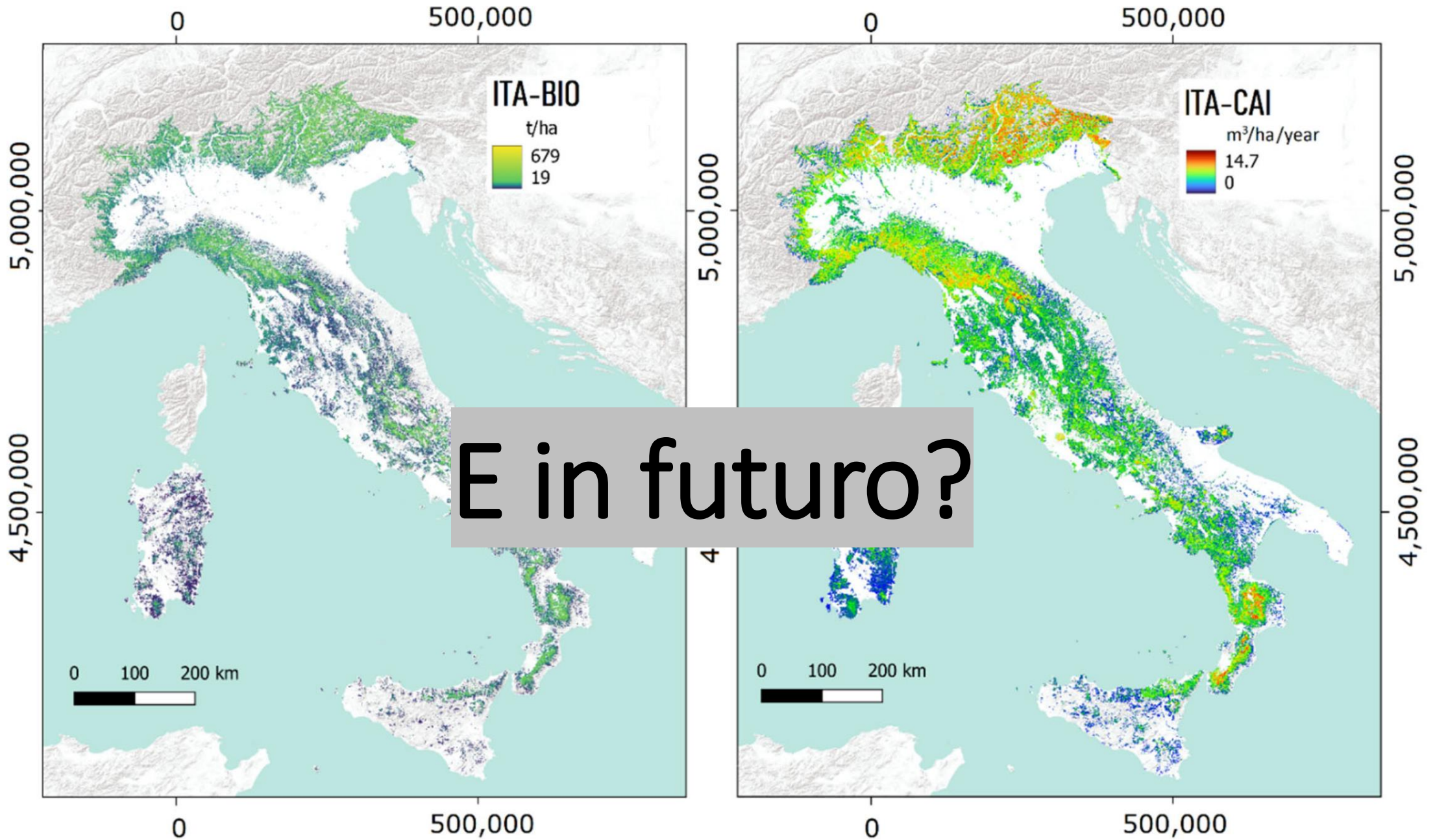


Source: Harris et al. 2021

20.01.21



WORLD RESOURCES INSTITUTE



E in futuro?

# Modelli di accrescimento forestale

Esistono diversi modelli utili a prevedere la crescita delle foreste.

Diversi modelli tengono conto di diversi processi: cambiamenti climatici, mortalità, dispersione dei semi, ciclo del carbonio, ciclo dell'acqua...



**CBM**  
**CFS** **3**

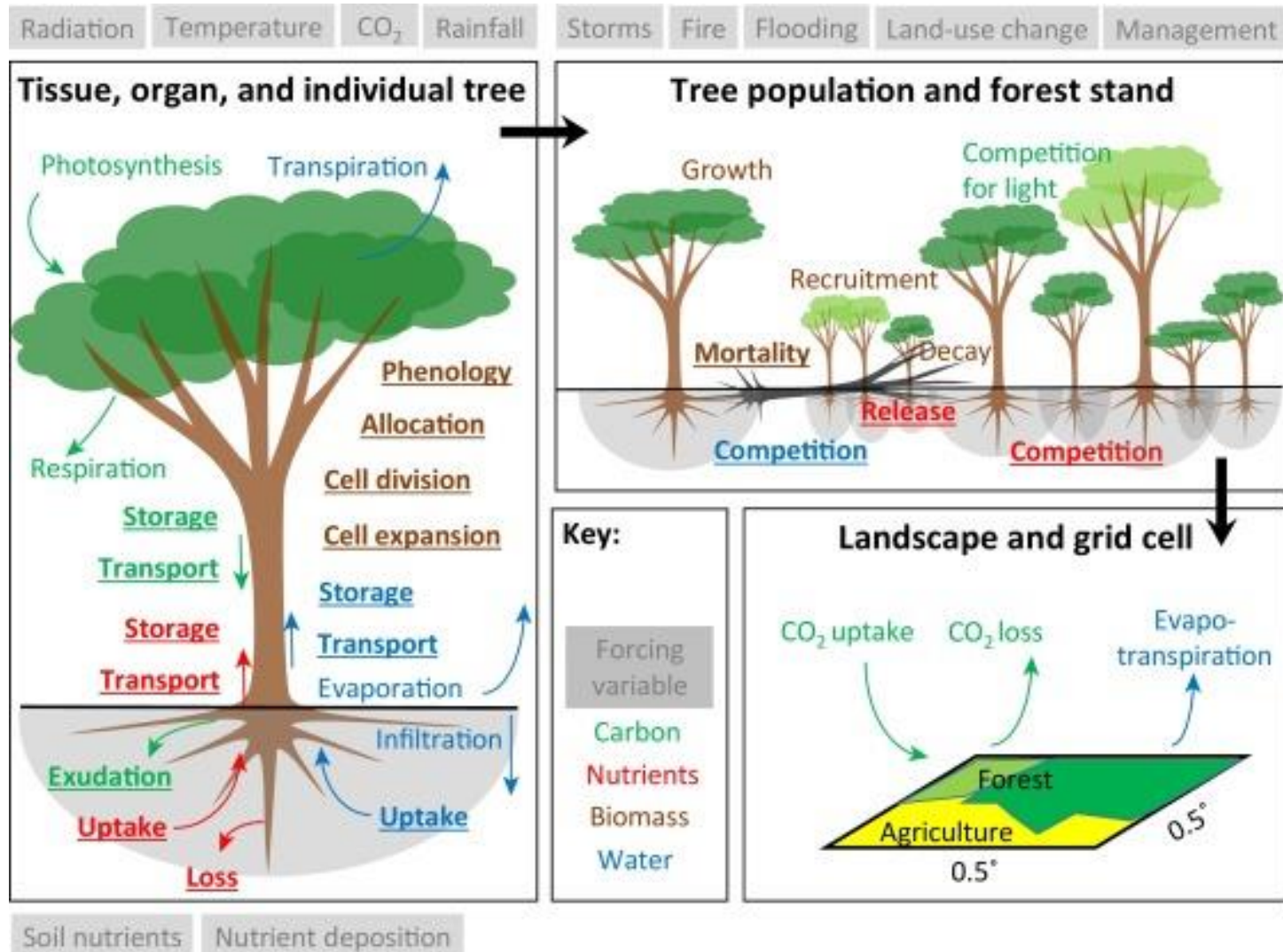


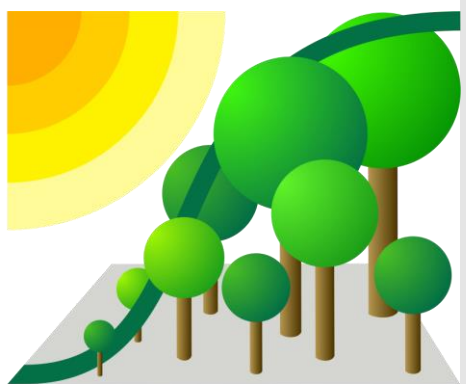
  
Forest **GALES**



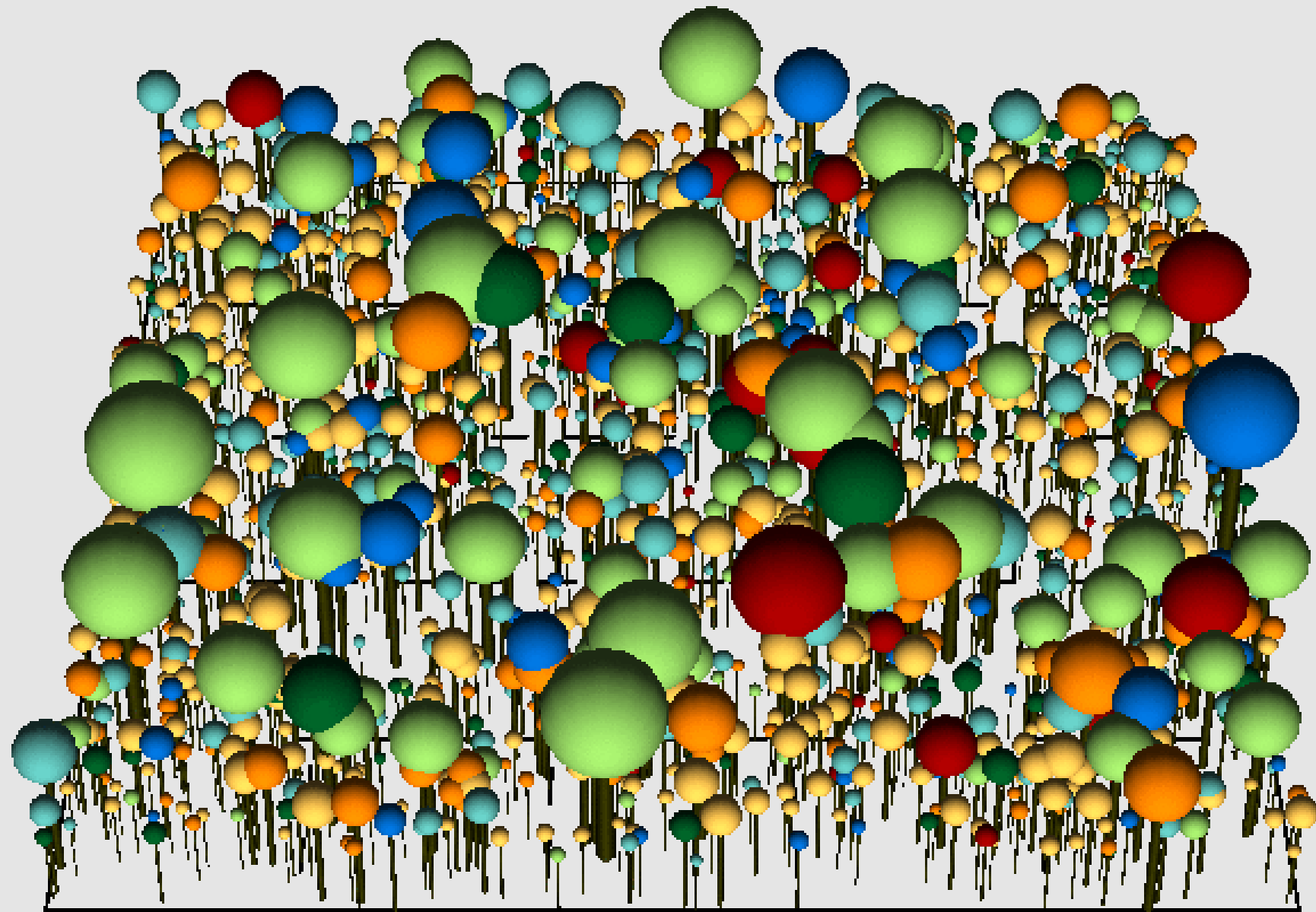
  
**Aland**

# Cosa succede in una foresta?



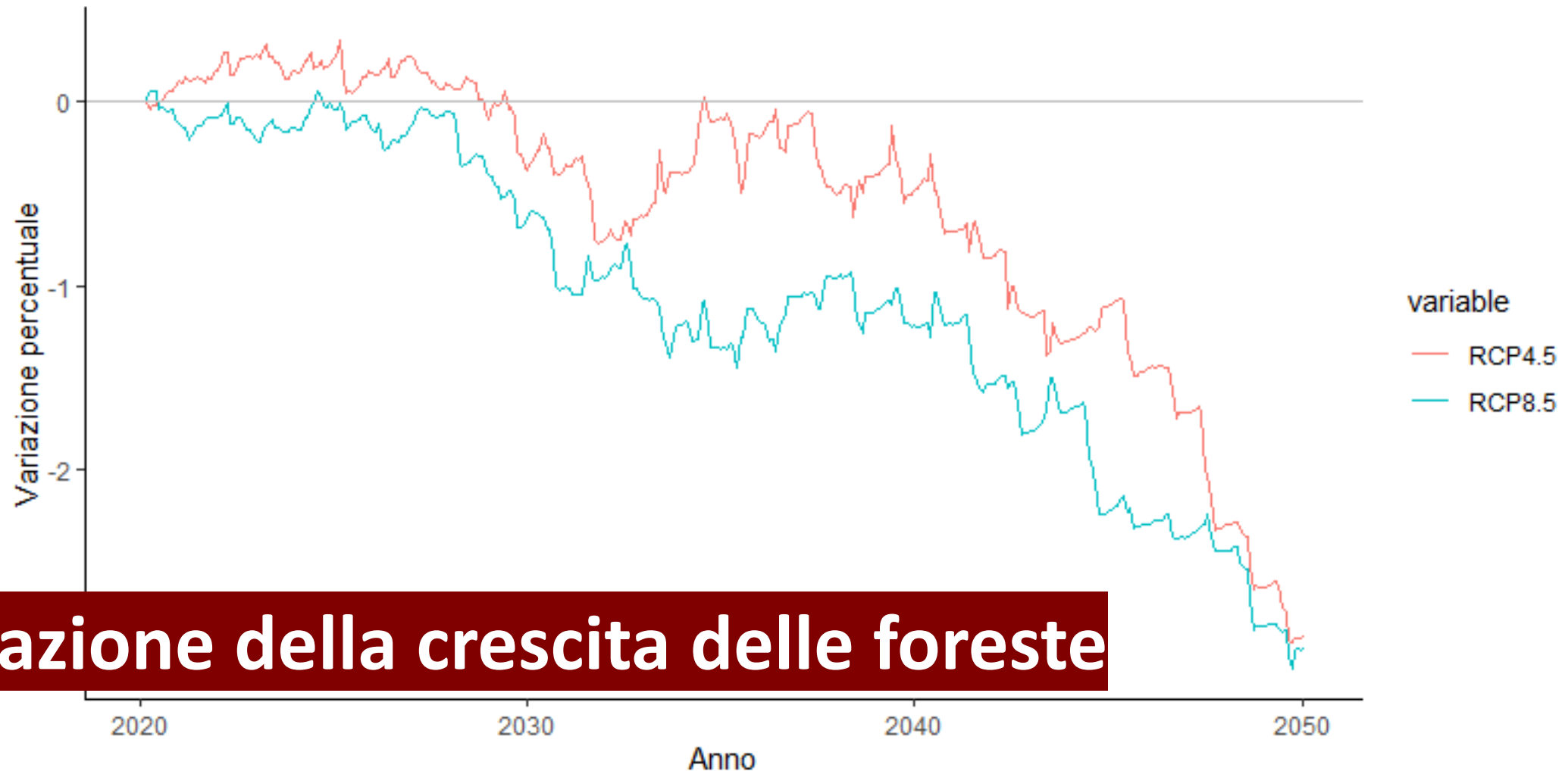


**FORMIND**



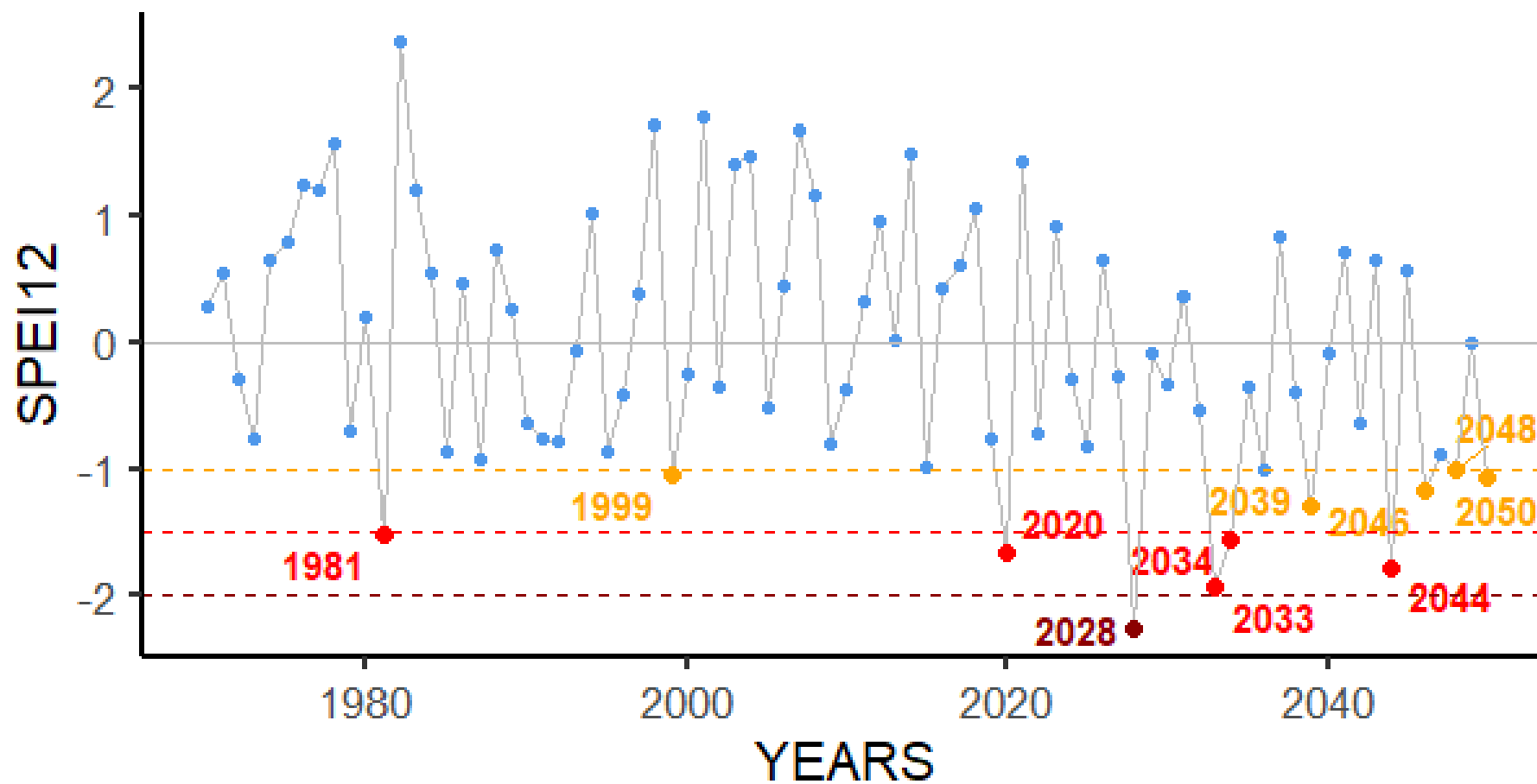
# Cosa si può ottenere dai modelli?

Cluster1 - Pino silvestre con presenza di castagno  
Variazione percentuale rispetto a clima storico



**Variazione della crescita delle foreste**

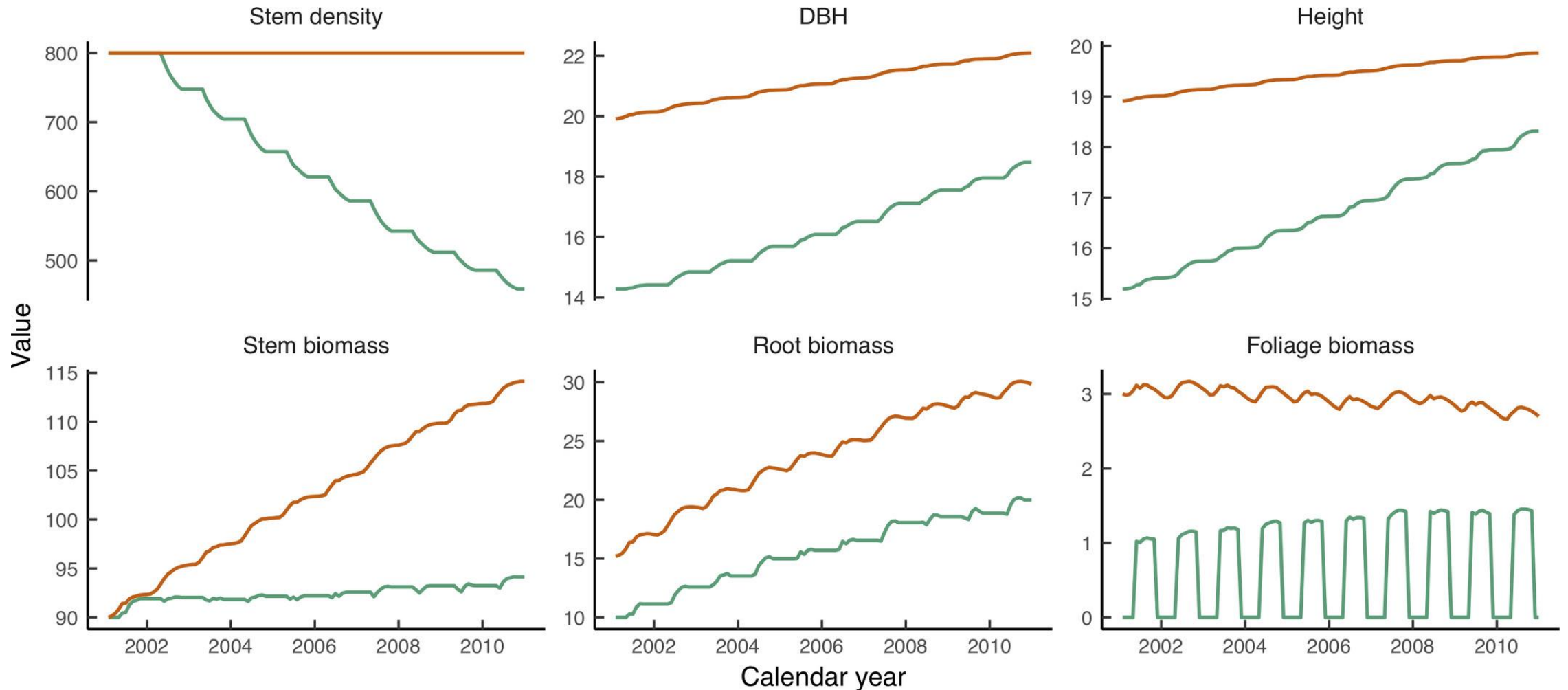
# SPEI12 - RCP8.5



**Variazione nel regime dei disturbi**

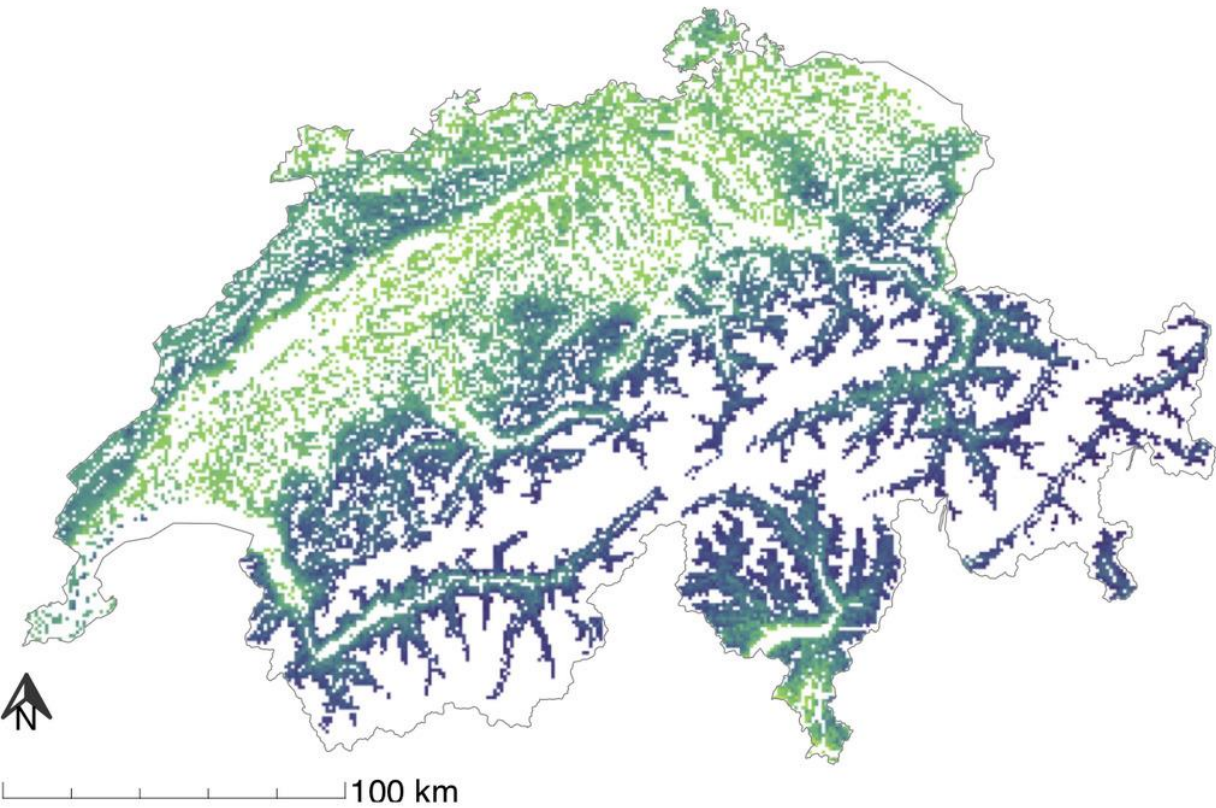


# Cosa si può ottenere dai modelli?

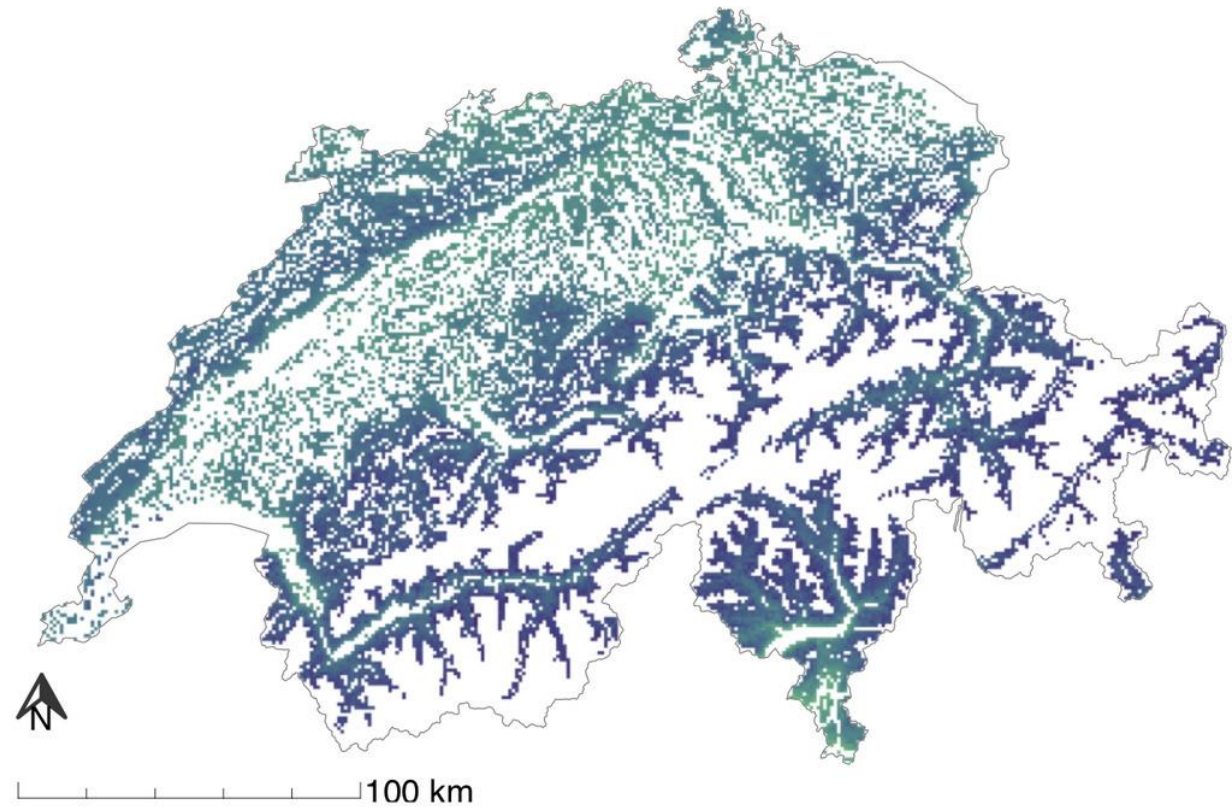


# Cosa si può ottenere dai modelli?

**(a)** Posterior predictive mean



**(b)** 95% posterior predictive credible interval



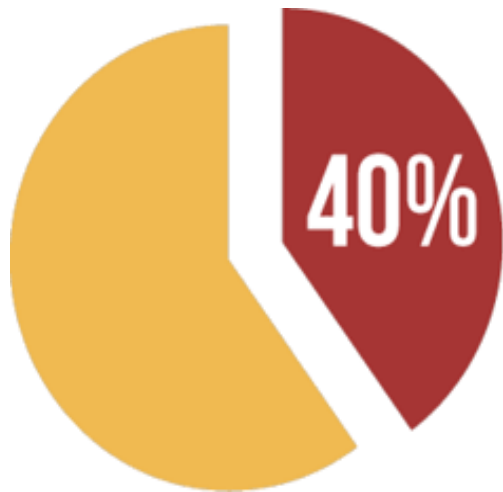
Biomass (Mg/ha )



# In Italia c'è margine per attuare una selvicoltura sostenibile

**% DI PRELIEVO RISPETTO ALL'INCREMENTO**

ITALIA

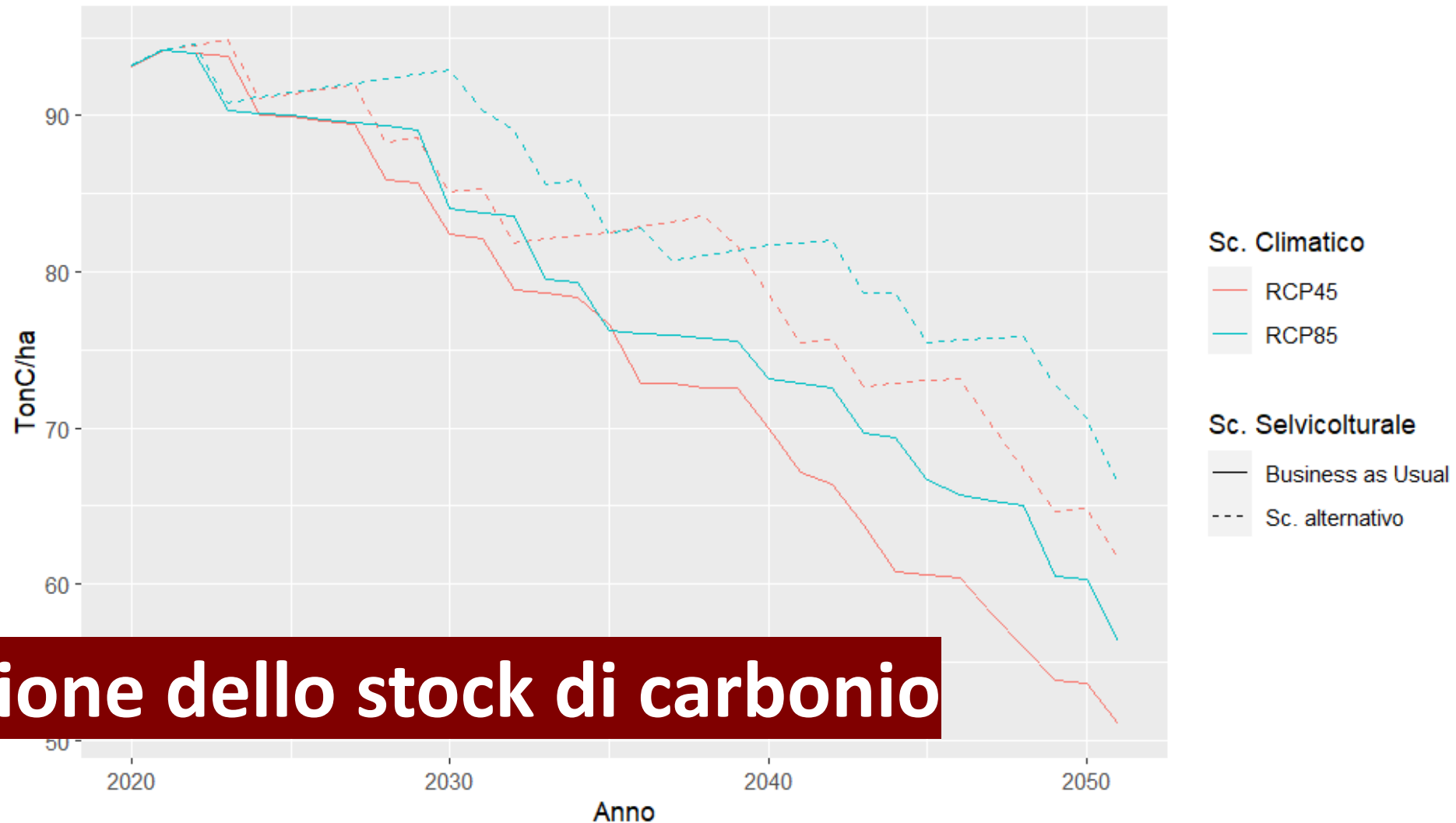


EUROPA



# Cosa si può ottenere dai modelli?

Carbonio/ettaro stoccato Pino Silvestre per clima e selvicoltura. Parco naturale



**Variazione dello stock di carbonio**

# Modelli e selvicoltura

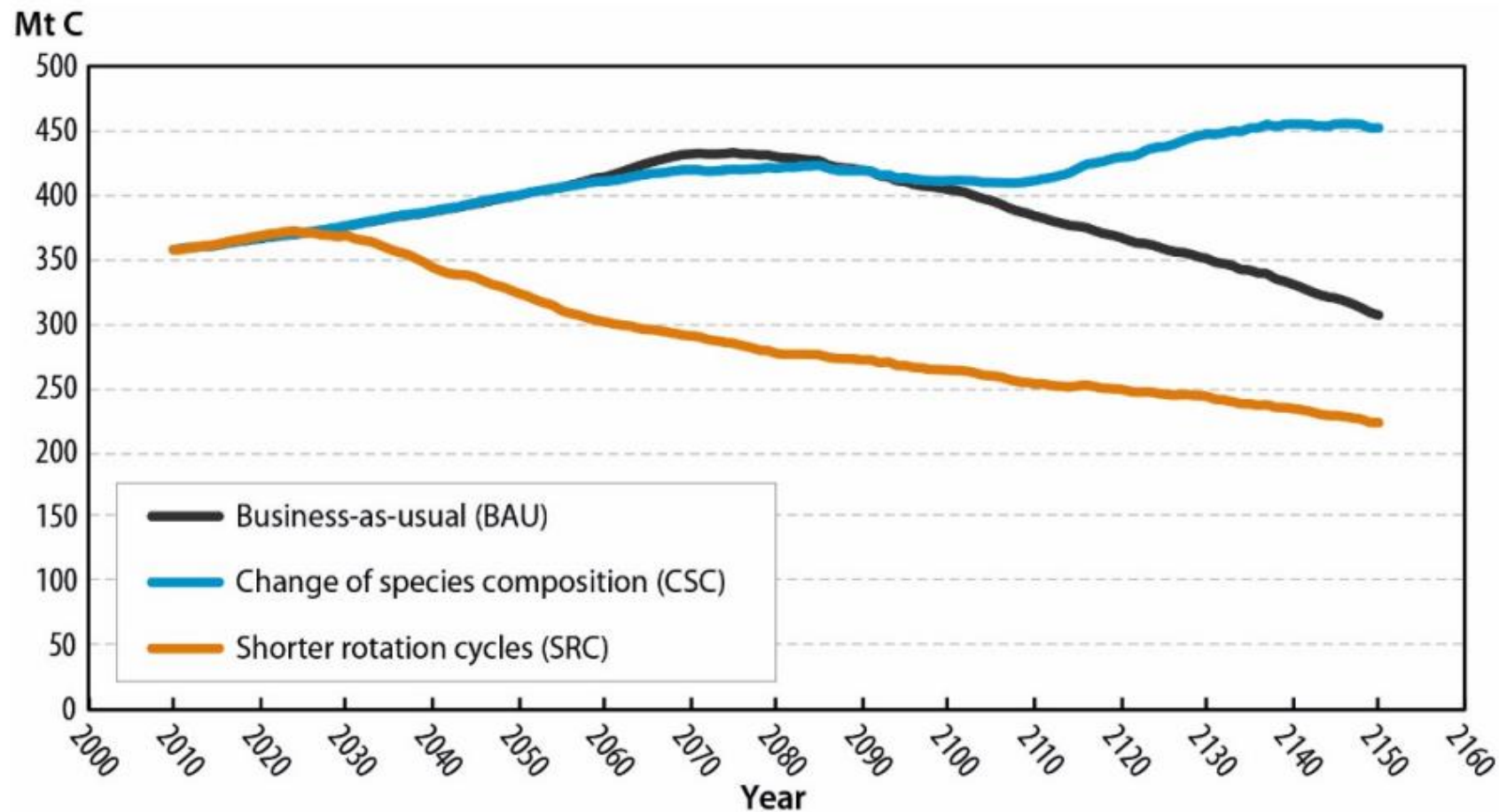


Figure 3. Carbon stock of Austrian forests in three forest management scenarios.



**Climate smart forestry**



**Adattamento - Riduzione della vegetazione combustibile**



## Adattamento – Riduzione rischio incendi

[sisef.org/2022/01/14/il-fuoco-nella-conservazione-dei-vaccinieti](https://sisef.org/2022/01/14/il-fuoco-nella-conservazione-dei-vaccinieti)





**Adattamento - Diradamenti per alleviare gli effetti della siccità**

An aerial photograph of a forest showing a significant portion of trees that are brown and dead, interspersed with green, healthy trees. This visual represents the impact of a bark beetle infestation on a forest ecosystem.

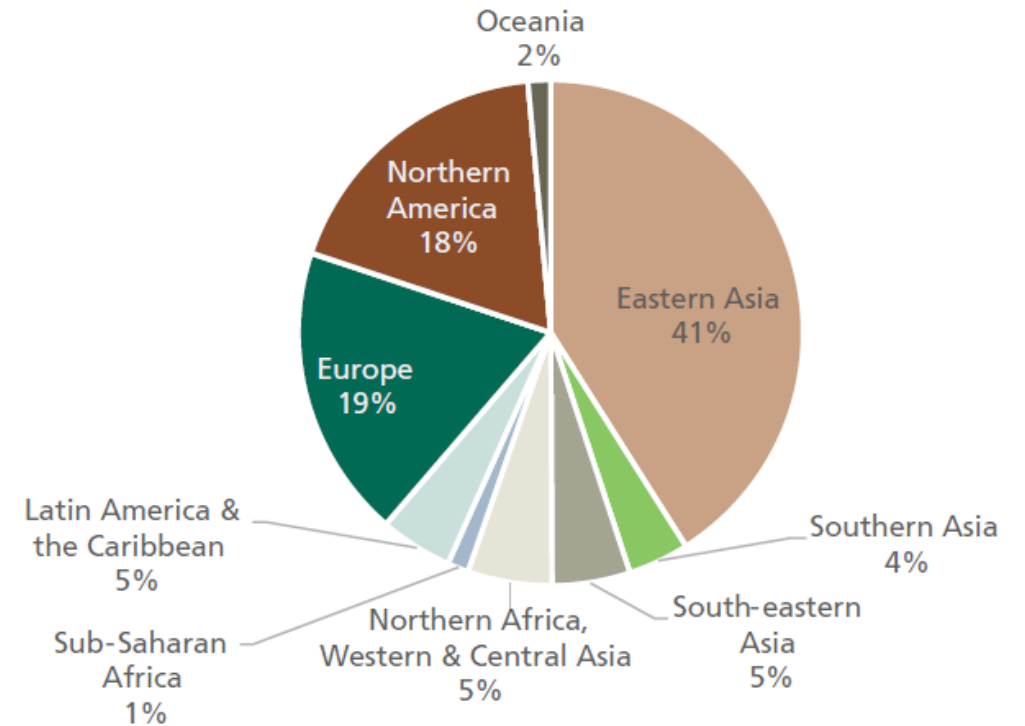
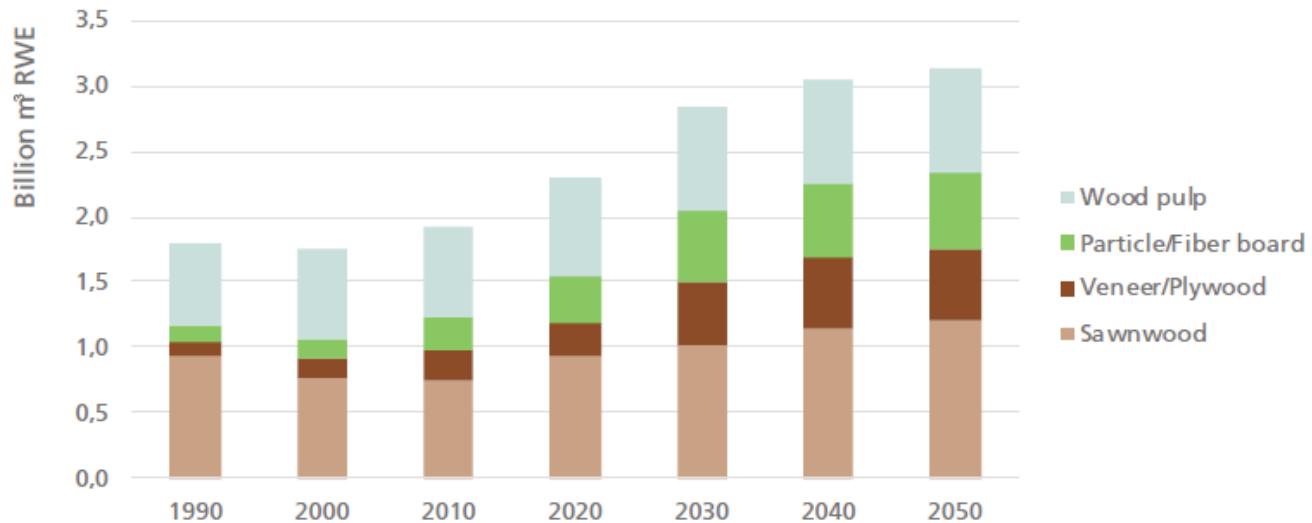
**Adattamento – Riduzione impatti bostrico**

A yellow and black tracked harvester is positioned in a forest, near a tree trunk. The harvester's arm is extended towards the tree. The forest consists of tall, thin trees with green foliage. The sky is blue with scattered white clouds. In the foreground, there are logs and some brush. A black text box is overlaid at the bottom of the image.

**Adattamento - Selvicoltura per ridurre la vulnerabilità al vento**

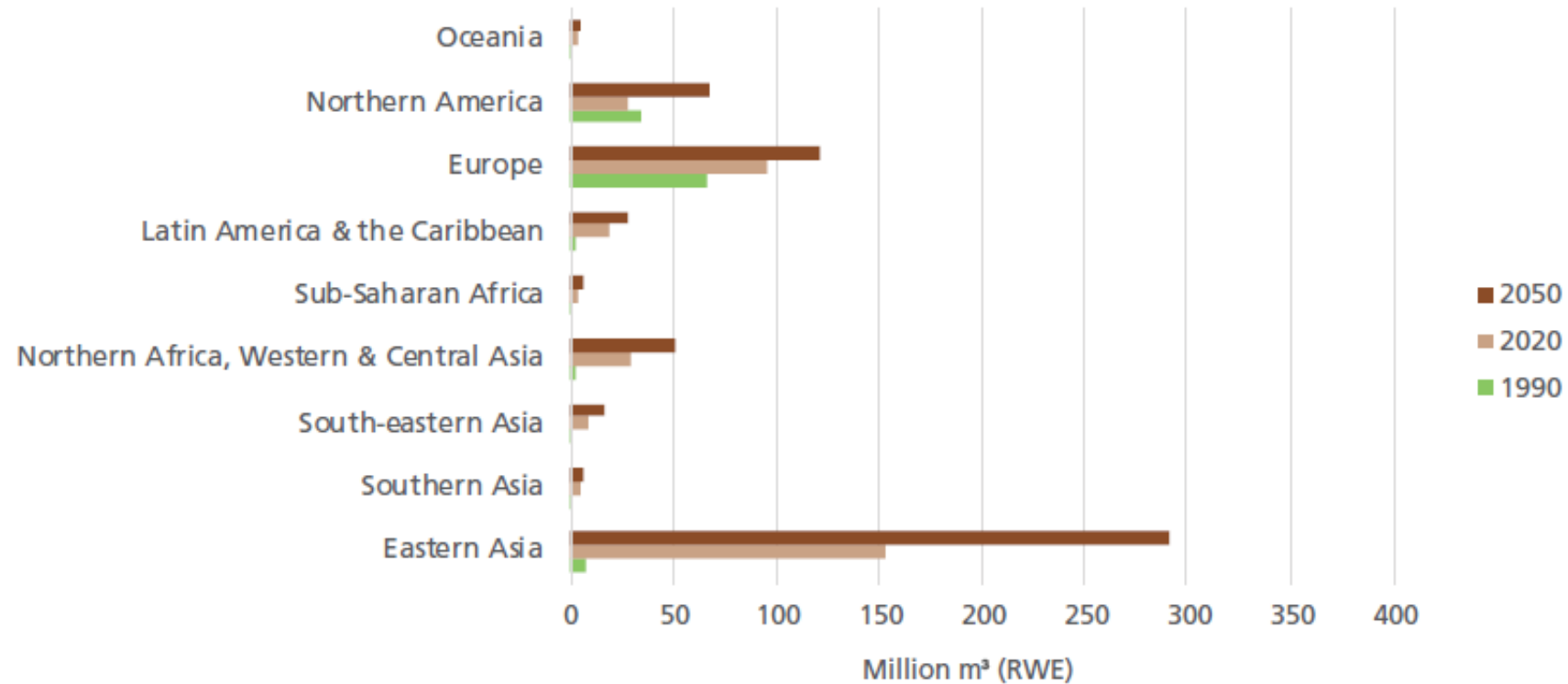
# Fabbisogno globale di legno al 2050

Figure 6. Global historical and projected consumption of wood products, 1990 to 2050



# Fabbisogno globale di legno al 2050

Figure 10. Historical and projected particle and fibre board consumption by world regions, 1990, 2020 and 2050



**Effetti di sostituzione**

Legno per usi materiali

**Stoccaggio di carbonio**

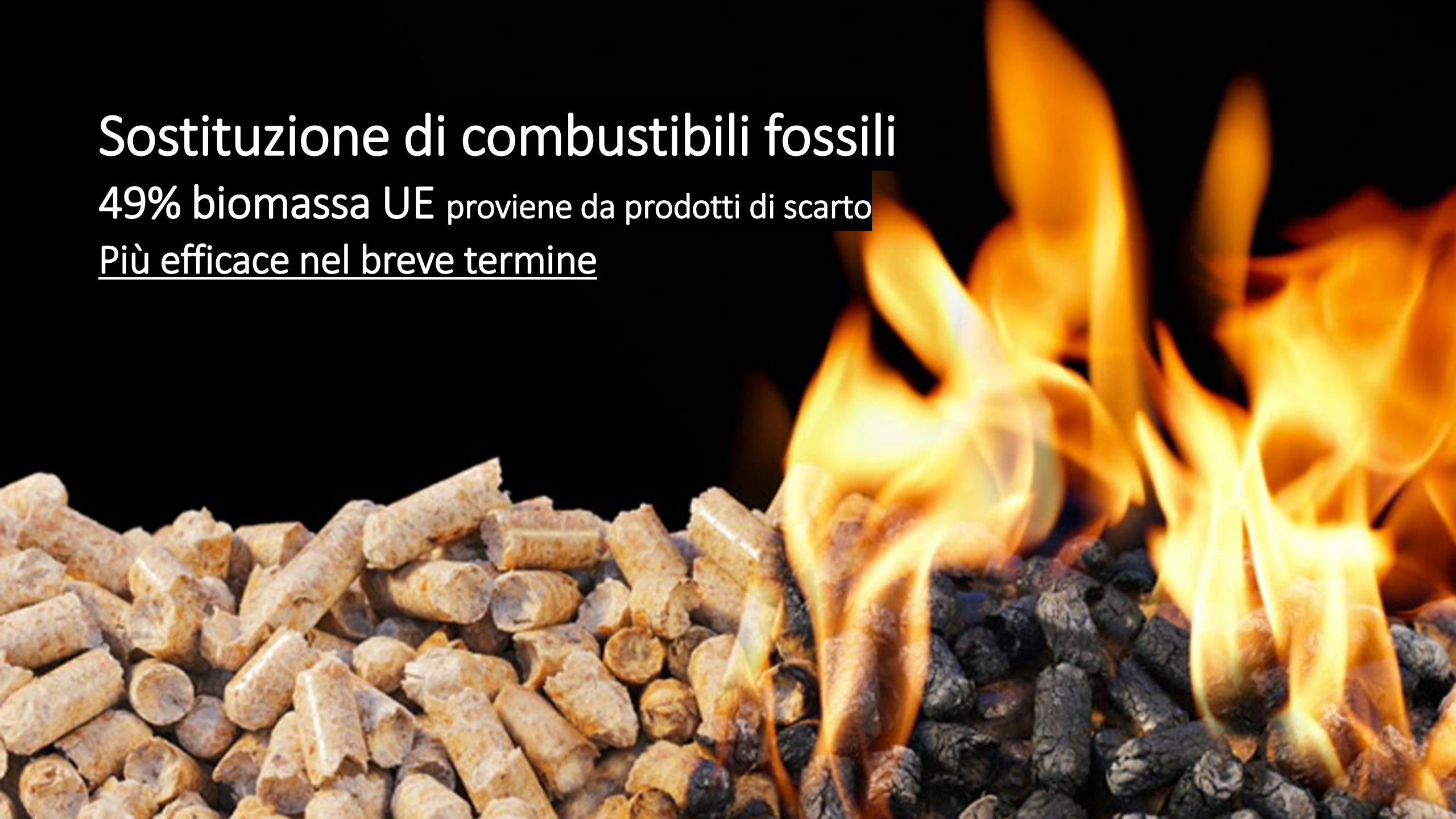
Carbonio bloccato nei materiali



# Sostituzione di combustibili fossili

49% biomassa UE proviene da prodotti di scarto

Più efficace nel breve termine





# Effetti di sostituzione del legno

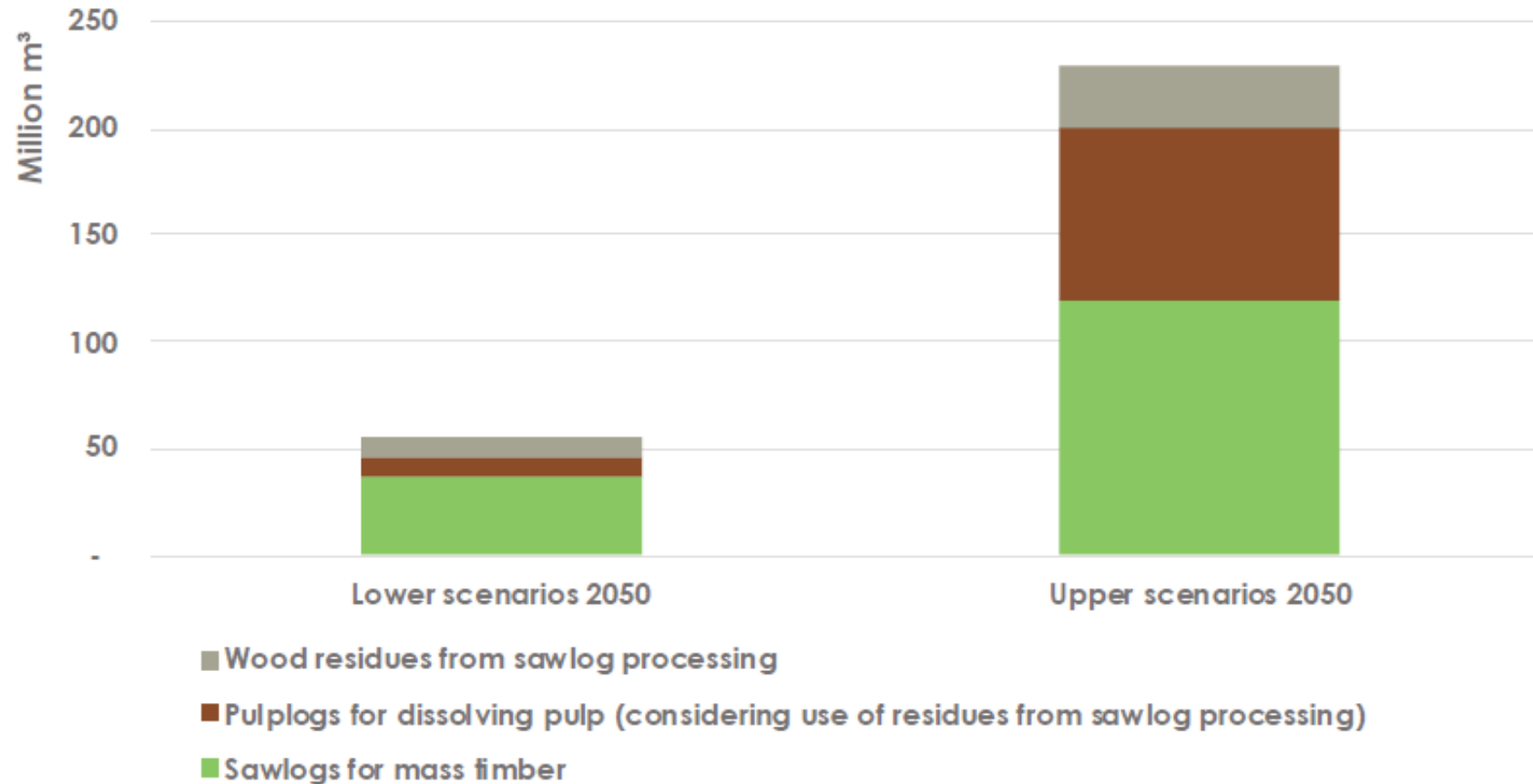
**1-2 tonnellate di CO<sub>2</sub> risparmiate per m<sup>3</sup>**

**Sostituzione di cemento, acciaio, plastica**



# Aumento richiesta di legname per sostituzione materiali non rinnovabili

Figure 23. Additional industrial roundwood demand by 2050 due to non-renewable material substitution





**Di cosa avremo bisogno?**

**Necessità di pianificazione forestale  
sostenibile**

**Investimenti**

**Costruzione di filiere**



Grazie